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Development and Criterion Validity of Differentiated and Elevated Vocational Interests in Adolescence

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Abstract

Interest differentiation and elevation are supposed to provide important information about a person's state of interest development yet little is known about their development and criterion validity. The present study explored these constructs among a group of Swiss adolescents. Study 1 applied a cross-sectional design with 210 students in eleventh grade. Study 2 applied a one-year longitudinal design with 289 students in seventh to eighth grade. Gender, personality traits, and career exploration were significant predictors of state and development of differentiation and elevation. Increase in differentiation predicted increase in career decidedness above traits. Elevation could not predict increase in exploration behavior over traits. The results provide support for differentiation and elevation as important aspects of adolescents' vocational interests.

Keywords: interest development, interests assessment, adolescence career development

Development and Criterion Validity of Differentiated and Elevated Vocational Interests in Adolescence

The traditional approach of interest assessment in career counseling is to assist clients in their career choice by matching interests to work environments and to predict job satisfaction and tenure (Holland, 1997). However, interest assessment can also provide information about a client's personal career theory (Reardon & Lenz, 1999), his or her likely degree of career choice readiness (Hirschi & Läge, 2007), or how the client can be expected to engage in the career decision-making process (Bullock & Reardon, 2005) by paying attention to the secondary constructs of interest inventories. Aspects such as interest profile differentiation, consistency, elevation, coherence, or congruence between measured interests and expressed aspirations do not focus on *what* a client is interested in but *how* his or her interests are developed and how they are likely to influence the career decision-making *process*.

For assessment practice two of these constructs seem especially important: interest differentiation and profile elevation. Differentiation refers to the degree of distinctness of a client's interests. A flat and undifferentiated profile not only makes it impossible to determine the best possible match to the client's interests, it can also be expected to be a major source of difficulties in career decision-making (Osipow, 1999). Elevation refers to the overall level of interest endorsement such as having general high or low interest scores on the inventory. Clients with low elevation present a challenge to the counselor because they do not seem to be as motivated to engage in career exploration which could severely inhibit their career development and the progress of the counseling process itself (Bullock & Reardon, 2005).

Research on Interest Differentiation

Correlates of interest differentiation have been examined for some years but Holland concluded that „differentiation continues to be weak construct“(Holland, 1997, p. 148). Indeed, there are several studies which question the utility of the differentiation construct by failing to find, for example, significant relations to psychological maladjustment (Buboltz & Woller, 1998), vocational identity (Leung, Conoley, Scheel, & Sonnenberg, 1992), career maturity (Miner, Osborne, & Jaeger, 1997), career decidedness (Lowe, 1981), or job stability and supervisor's evaluation (Meir, Esformes, & Friedland, 1994).

However, there are also numerous studies which imply that having differentiated interests can indeed be considered a sign of more adaptive personality traits and is subsequently related to better career adaptability. Specifically, this research showed that more differentiated interests are related to more stable career aspirations and vocational interests (Bergmann, 1993; Holland, 1968), problem solving abilities (Holland, Gottfredson, & Nafziger, 1975), career maturity for females (Miner, Osborne, & Jaeger, 1997), career choice readiness and vocational identity for adolescents (Hirschi & Läge, 2007), and career certainty (Sackett & Hansen, 1995) as well as a more advanced identity status among college students (Nauta & Kahn, 2007). Others found that poorly differentiated interests are related to less conscientiousness but more openness for female university students (De Fruyt & Mervielde, 1997). Several studies also investigated group differences in interest differentiation and found that female college students and career clients have generally more differentiated interests than males (Fouad & Mohler, 2004; Miner, Osborne, & Jaeger, 1997), students in eleventh grade show more differentiated

interests than students in eighth grade (Hall, Kelly, & Van Buren, 1995) or that adjudicated adolescents showed lower differentiation than a normative sample (Glaser, Calhoun, Bates, & Bradshaw, 2003). No general differences were found among ethnic groups or between students with an immigration background to native-born students (Fouad & Mohler, 2004; Hirschi & Läge, 2007).

One potential problem in these analyses is that less differentiation might also be a sign of multipotentiality which could explain some of the ambiguous findings. For these persons low differentiation is not a sign of a problematic personality or of maladjustment. One approach to account for this notion, which has not been done in previous research, is to control for favorable/unfavorable personality traits such as neuroticism, conscientiousness, or openness when investigating the influence of differentiation on outcome criteria.

Another critical issue that has been raised is that interest differentiation has to be interpreted in conjuncture with interest elevation. Swanson and Hansen (1986) provided evidence that undifferentiated interests relate differently to criterion variables when interest elevation is taken into account. Specifically, low differentiation and low elevation was related to less internal consistency of the interest profile, lower GPA, and lower persistence in college when compared to students with undifferentiated but highly elevated profiles. Another study found that adolescents with low differentiation/low elevation showed less career choice readiness than low differentiation/high elevation students (Hirschi & Läge, 2007). These findings might provide another clue to the ambiguous research literature on interest differentiation and call for a combined examination of differentiation and elevation.

Research on Interest Profile Elevation

It has long been asserted that persons with highly elevated interest profiles are enthusiastic, sociable, dominant, impulsive, and cheerful, whereas those who dislike a high number of items in an interest inventory tend to be characterized as cynical, cautious, or depressive (Berdie, 1943; Stewart, 1960). More recently, Prediger (1982) found that a general factor underlies most interest inventories which relates to the overall level of responding. However, he (Prediger, 1998) concluded that this factor is merely an indicator of response style and should not be interpreted as the strength of interests. Indeed, he found that students with higher scores in an interest-field are not more likely to enter that specific field than students with lower scores. Gottfredson and Jones (1993) also concluded that profile elevation is only modestly related to external criteria such as involvement, interpersonal competency, identity, or positivity and would therefore be of only marginal practical relevance.

However, a number of studies could show that profile elevation is meaningfully related to personality characteristics. Specifically, positive relations were found to openness, extraversion, and conscientiousness, and negative relations to neuroticism and depressive personality (Ackerman & Heggestad, 1997; Costa, McCrae, & Holland, 1984; De Fruyt & Mervielde, 1997; Fuller, Holland, & Johnston, 1999; Holland, Johnston, & Asama, 1994). Others reported positive relations to more career planning and career exploration attitudes among adolescents (Hirschi & Läge, 2007). Ackerman and Heggestad (1997) found that profile elevation is moderately correlated with intellectual engagement and shows positive relations to a wide variety of academic content knowledge scales.

Based on this positive evidence of the meaningfulness of interest profile elevation Darcy and Tracey (2003) viewed profile elevation as a general interest factor which indicates vocational flexibility and Bullock and Reardon (2005) regarded profile elevation as an indicator of a client's energy level.

Summary

The above reviewed literature suggests that both interest profile differentiation and elevation are meaningful constructs which are related to a variety of positive personality characteristics. However, little is known about the development of these constructs. What are predictors of developing differentiated or elevated interests and what is their predictive validity on attitudes and behaviors in the career decision-making process?

Present Study and Hypotheses

The first goal of the present study was to investigate antecedents of interest differentiation and elevation development in adolescence. The time of early to late adolescence seems especially fruitful for such an examination since interests consequently crystallize and stabilize during this period (Low & Rounds, 2007). As possible predictors of differentiation and elevation big five personality traits of neuroticism, extraversion, openness, agreeableness, and conscientiousness (McCrae & Costa, 1999) were examined. As reviewed above, they showed meaningful relations to elevation and differentiation and might thus also be significant predictors of their development. A second group of predictors which was examined in the present study was career exploration behavior. Exploration is an important prerequisite for interest

development due to its promotion of learning experiences in different fields (Lent, Brown, & Hackett, 1994; Mitchell & Krumboltz, 1996). The study distinguished between self-exploration and environmental exploration as two related yet distinct components of career exploration (Stumpf, Colarelli, & Hartman, 1983). It was expected that the assessed personality traits predict the development of interest differentiation and elevation and that exploration behavior explains a significant amount of predicted variance of their development above basic traits.

The second goal of the study was to examine for the criterion-related validity of differentiation and elevation. Differentiation is commonly assumed to be an indicator of a more developed vocational identity and should also be positively related to career commitment and decidedness (Holland, 1997). The study investigated whether more differentiation predicts more decidedness and a more developed vocational identity. Since elevation is seen as an indicator of energy and flexibility, it was explored whether it is a predictor of more career exploration. In both analyses basic personality traits were controlled for to establish the discriminate validity of elevation and differentiation above basic traits. Also, the interaction of elevation and differentiation was explored to account for any moderator effects between these two variables. It was hypothesized that differentiation and elevation are significant predictors of the respective criterion variables above the influence of basic traits. It was further expected that the interaction of differentiation and elevation shows a significant effect in the way that low differentiation and low elevation predicts less favorable outcomes in the dependent variables.

Study 1 used a cross-sectional design to investigate the research questions among students in middle to late adolescence. Study 2 applied a one-year longitudinal approach to address the same questions among a group of students in early adolescence.

Method

Participants

Study 1. Participants were 210 high-school students from a German speaking part of Switzerland. They attended the eleventh grade in vocational education and training (n = 131) or in general high-school which prepares for later college education (n = 79). Sixty-eight percent (n = 144) were girls, 2 students did not indicate gender. Their age ranged from 16 to 20 years (M = 17.5, SD = 1.0) Most had a Swiss nationality (81.9%) the others had an immigration background with nationalities mostly from South-Eastern Europe. Race was not assessed since differentiating students according to race is not common practice in Switzerland. However, almost all students in the region were white.

Study 2. Participants were 289 students from the same area as participants in Study 1. At the time of first data collection they were near the end of seventh grade, at the second measurement time near the end of eighth grade. At the time of first data collection their ages ranged from 13 to 16 years (M = 14.1, SD = 0.7). Forty-eight percent (n = 140) were boys, 82 percent (n = 237) had a Swiss nationality the others had nationalities mainly from South-Eastern Europe. This group of students went through an important career decision-making process in eighth grade which is supported by official school curriculums with classes on career development. They have to decide which educational/vocational track they want to follow after finishing compulsory school in ninth grade. Career planning and exploration become a major focus in the eighth grade

and is supported by school lessons on career development and self-directed as well as structured career exploration activities. This necessity to actively confront one's interests makes this grade in Switzerland especially useful for the present investigation.

At the second measurement point 34 (12%) of the students did not fill out the questionnaires due to absence from class at the day of data collection. These students do not differ on any of the assessed measures at the first measurement point. The remaining students (N = 255) consisted of 53.7 percent girls and 83.5 percent Swiss nationals (mean age 14.03; SD = 0.7).

Measures

Vocational interest differentiation and elevation. Interests were assessed with the Revised General Interest Structure Test (Allgemeiner Interessen Struktur Test – Revidierte Version; Bergmann & Eder, 2005) which is the best established and most frequently used interest inventory for adolescents in German speaking countries. The inventory consists of 60 items each describing a particular activity in one of Holland's (1997) six interest domains in alternative order. Answers are provided on a 5-point Likert scale ranging from *not at all interested* to *very interested* where higher points indicate more interest in this activity. The authors of the inventory provided support for the inventory's construct validity with adolescents, for example, high correlates to the German language adaptation of the SDS scales (Jörin, Stoll, Bergmann, & Eder, 2004), differences between people employed in different vocations, as well as significant relations to basic personality traits. The authors of the scale also reported very satisfactorily reliabilities for all six scales with adolescents ranging from .82 to .87 (Alpha) and from .85 to .92 for a one-month re-test stability. *Differentiation* was

calculated as the standard deviation of all six standardized RAISEC scores for each student. This measure is different from the frequently applied measure of subtracting the score of the lowest score from highest score (Holland, 1997). However, taking the standard deviation is considered the best approach to calculate differentiation in research (Bergmann, 1993) since it has the advantage of taking into account all six scores and is also independent of profile elevation (Fouad & Mohler, 2004; Sackett & Hansen, 1995). *Elevation* was measured as the sum of all six standardized RIASEC scores for each student (Bullock & Reardon, 2005).

Personality traits. Neuroticism, extraversion, agreeableness, openness, and conscientiousness were assessed with the official German language adaptation of the NEO-FFI (Borkenau & Ostendorf, 1993; Costa & McCrae, 1992). The scale consists of 60 statements (e.g., "I am not easily worried") which tap each of the five constructs in alternative order. Higher points indicate a higher value in the assessed construct. The authors of the scale provided compelling support for its factor structure, reliability and construct validity in terms of correlations to other established personality inventories. Based on scale evaluation studies with large groups of adolescents (Lüdtke, Trautwein, Nagy, & Köller, 2004; Rost, Carstensen, & von Davier, 1999; Roth, 2002), a restricted item set (58 items in Study 1 and 54 items in Study 2) and a 4-point Likert scale ranging from *strongly disagree* to *strongly agree* was applied since some items showed very unsatisfactorily factor loadings and item-intercorrelations among adolescents. The obtained reliability coefficients (Cronbach's Alpha) in Study 1 were .83 for neuroticism, .75 for extraversion, .69 for openness, .68 for agreeableness, and .77 for conscientiousness. For Study 2 the respective coefficients were .77, .73, .43, .69, and .78.

Career exploration. As is the case in the Career Exploration Survey (Stumpf, Colarelli, & Hartman, 1983), students were asked to indicate on a 5-point Likert scale to what extent they have engaged in different career exploration behaviors during the last three months, with answers ranging from *seldom/few* to *very much/a lot*. Four items taped self-exploration (e.g., "thinking about personal strengths and skills") and six items tapped environmental exploration (e.g., "acquire information about career fields of interest"). Positive evidence for construct validity was provided with significant relations to the CDI Career Exploration Scale (Super, Thompson, Lindeman, Jordaan, & Myers, 1981), generalized self-efficacy beliefs, and career decidedness among adolescents in eighth grade (Hirschi, 2008). Reliabilities (Alpha) for Study 1 were .81 for self-exploration and .88 for environmental exploration. For Study 2 the respective values were .83 and .88.

In Study 2 career exploration at the end of seventh grade (first measurement point) was assessed with a subscale of the German language adaptation of the *Career Development Inventory* (Seifert & Eder, 1985; Super, Thompson, Lindeman, Jordaan, & Myers, 1981). The first part of the career exploration scale was applied which includes 13-items asking students to indicate, how much useful information for their career development they have already obtained from different sources (e.g., my father, my teacher, job-shadowing). Answers are given on a 5-point Likert scale with higher scores indicating more active career exploration. Support for the construct validity with adolescents in ninth grade of this reduced scale was reported with significant relations to career decidedness, career planning, and success in finding an apprenticeship after school among Swiss adolescents (Hirschi & Werlen Lutz, 2007). Cronbach's Alpha for this subscale was .75 within the present sample.

Career decidedness. Study 2 assessed career decidedness at the first and the second measurement point with the respective scale of the German language adaptation of the *Career Maturity Inventory* (Crites, 1973; Seifert & Stangl, 1986). The scale consists of 12 items (e.g. "I don't know exactly what to do in order to choose the right occupation") and answers are indicated on a 4-point scale. The final scale scores were inversed so that higher scores indicated more career decidedness and commitment. Studies showed that students with higher career commitment on this measure were more active in applying for an apprenticeship after school and also more successful in actually finding an apprenticeship (e.g., Bergmann, 1993; Seifert, 1993). Reliabilities (Cronbach) were .86 and .88 at the two measurement points, respectively.

Vocational identity. Study 1 assessed the clarity of a student's awareness of own interests, abilities, and values with the German language adaptation of the *Vocational Identity Scale* (Holland, Daiger, & Power, 1980; Jörin, Stoll, Bergmann, & Eder, 2004). The scale consists of ten items and students can indicate how much the statements (e.g., "I'm not sure yet which occupations I could perform successfully") resemble their personal situation ranking from *not at all* to *completely*. Answers were provided on a 5-point Likert scale where higher scores indicate more problems with vocational identity. For the present study, the scale scores were inversed so that higher scores indicated a more developed identity. Studies could show that the scale shows positive correlations to career decidedness, career planning, and career exploration among adolescents (Hirschi & Läge, 2007). Cronbach's Alpha in the present sample was .77.

Procedure

Teachers and students of the participating schools were contacted prior to assessment and invited to participate in the study. Students in both studies and parents of Study 2 participants received brief information about the general nature of the study. Participation was voluntary, but all students in the respective classes completed the questionnaires if present at the time of data collection. All data were collected during an ordinary school lesson under the supervision of the teacher.

Study 1. Students completed the interest inventory, the NEO, and the scales for career exploration and vocational identity during an ordinary school lesson in their classrooms under the supervision of their classroom teachers.

Study 2. Participants filled out the interest inventory, career decidedness scale, and the CDI exploration scale at the first measurement point at the end of seventh grade. At the end of eighth grade, approximately one year later, the filled out the interest inventory and the career decidedness scale again, as well as the career exploration scale and the NEO. Theoretically, the NEO traits are largely innate traits which should not change much over the course of the live-span (McCrae et al., 2000). They were assessed at the second measurement point since it was expected that the psychometric proprieties of the scales are better when the students are older (Roth, 2002).

Results

Study 1

Preliminary analyses. The correlations in Table 1 show that female students had more differentiated profiles than boys. They also reported more neuroticism and

agreeableness but less environmental exploration. No gender differences emerged in elevation. Students with Swiss nationality did not differ on any measure from students with immigration background. Profile differentiation was modestly related to extraversion but not the other personality traits or career exploration behavior. Elevation was positively related to openness and more self- and environmental exploration.

[Insert Table 1 about here]

Predictors of differentiation. To investigate to what extend interest differentiation was predicted by personality traits and exploration behavior a multiple hierarchical regression analysis was conducted. Gender and nationality were controlled for by entering them first into the equation. In a next step, the five personality traits were entered and in a third step the two values for exploration behavior. All values were standardized before calculating the regression. The results showed that differentiation was significantly predicted by female gender and nationality, $F(2, 205) = 11.04$, $p < .001$, $R^2 = .100$. However, neither the personality traits, $\Delta F(5, 200) = 1.5$, $p = .184$, $\Delta R^2 = .033$, nor exploration behavior, $\Delta F(2, 198) = 0.7$, $p = .504$, $\Delta R^2 = .006$, could explain an additional amount of variance in differentiation. Female gender was a single significant predictor of more differentiation ($\beta = .294$, $p < .001$). This finding contradicts the hypothesis that differentiation is influenced by personality traits and conducted exploration behavior.

Predictors of elevation. To investigate whether elevation was predicted by personality and exploration behavior the same procedure was applied as outlined above for differentiation. Elevation was not significantly predicted by gender and nationality, $F(2, 205) = 0.7$, $p = .487$, $R^2 = .007$. The personality traits explained a significant amount

of additional variance, $\Delta F(5, 200) = 4.1$, $p = .002$, $\Delta R^2 = .092$, and particularly exploration behavior could explain the major part of elevation variance, $\Delta F(2, 198) = 17.0$, $p < .001$, $\Delta R^2 = .132$. More openness ($\beta = .262$, $p < .001$), less agreeableness ($\beta = -.163$, $p = .024$), and more self- ($\beta = ,.211$ $p = .005$) and environmental exploration ($\beta = .222$, $p = .004$) emerged as single significant predictors of more interest elevation. The results support the hypothesis that elevation is predicted by personality and conducted exploration behavior.

Criterion validity of differentiation. The next set of analyses were undertaken to test the hypothesis that more differentiation would predict a higher developed vocational identity. Again, gender and nationality were controlled for by entering them first into the equation. The personality traits were entered in a second step. Elevation and differentiation were entered in a third step. The simultaneous examination of elevation and differentiation controled for shared variance among the two constructs. In step four the interaction term of elevation and differentiation was added to account for any additional variance that might be explained by this interaction above the values of differentiation and elevation alone.

The results showed that vocational identity was significantly predicted by personality traits, $\Delta F(1, 197) = 0.7$, $p = .395$, $\Delta R^2 = .157$, above the non-significant influence of gender and nationality, $\Delta F(5, 200) = 7.5$, $p < .001$, $R^2 = .003$. However, neither differentiation and elevation, $\Delta F(2, 198) = 0.7$, $p = .478$, $\Delta R^2 = .006$, nor the their interaction, $\Delta F(1, 197) = 0.7$, $p = .395$, $\Delta R^2 = .003$, could explain a significant amount of variance above personality traits in vocational identity. This did not support the

hypotheses that differentiation will influence the degree of vocational identity above the influence of personality traits.

Criterion validity of elevation. A regression analysis was conducted to test the hypothesis that more interest elevation would predict more career exploration. The sum-score of the standardized measures for self- and environmental exploration were taken as a measure for general career exploration which was the dependent variable. The results showed that gender and nationality were not significant predictors of exploration, $F(2, 205) = 2.5$, $p = .081$, $R^2 = .024$. Personality traits could also not significantly add explained variance, $\Delta F(5, 200) = 1.9$, $p = .091$, $\Delta R^2 = .045$, but more openness ($\beta = .165$, $p = .019$) and conscientiousness ($\beta = .149$, $p = .035$) were single significant predictors. Elevation and differentiation explained a significant amount of variance above traits, $\Delta F(2, 198) = 17.0$, $p < .001$, $\Delta R^2 = .137$, with more elevation ($\beta = .389$, $p < .001$) predicting more exploration. Finally, the interaction of elevation and differentiation was also a significant predictor ($\beta = -.155$) above the influence of elevation and differentiation alone, $\Delta F(1, 197) = 4.3$, $p = .039$, $\Delta R^2 = .017$. The interaction showed a negative influence on exploration which indicated that students with low differentiated/low elevated and high differentiated/high elevated interests showed less exploration than students with high differentiated/low elevated or low differentiated/high elevated profiles. The results support the hypothesis that profile elevation predicts career exploration behavior above personality traits and that students with low differentiated/low elevated profiles also show less exploration activity.

Study 2

Preliminary analyses. The bivariate correlations in Table 2 show that girls had more differentiated interests at both measurement points and more elevated interests at T1 than boys. No differences for nationality emerged. Differentiation was not significantly related to any measure at T1 but showed a negative relation to elevation and neuroticism and positive relations to extraversion, agreeableness, conscientiousness, and self-exploration at T2. The expected relation to decidedness was not found. Elevation at T1 was positively related to more exploration and openness and to more openness and more environmental exploration at T2.

[Insert Table 2 about here]

Development of differentiation. To test whether the development of differentiation was predicted by personality traits and exploration behavior, a multiple hierarchical regression analysis was conducted. Differentiation at T2 was taken as the dependent variable. In a first step, differentiation at T1 was included in the model. This accounted for the stability of the measure over time and the autoregressive effect of differentiation over the two measurement point. The explained variance of all the variables entered in latter steps thus related to *change* in differentiation over time above what could be expected from the stability of the measure itself. In a second step, gender and nationality were added as control variables. Personality traits were entered in a third step and exploration behavior in a fourth. All variables were standardized before entering them into the equation. As the results showed, gender and nationality predicted a significant amount of change in differentiation over time, $\Delta F(2, 249) = 4.5$, $p = .011$, $R^2 = .273$, $\Delta R^2 = .027$. The personality traits explained an additional amount of variance in change,

$\Delta F(5, 244) = 3.8$, $p = .003$, $\Delta R^2 = .052$. Exploration behavior also explained additional variance above personality traits, $\Delta F(2, 242) = 6.3$, $p = .002$, $\Delta R^2 = .034$. Male gender ($\beta = .126$, $p = .003$), more self-exploration ($\beta = .214$, $p < .001$) but less environmental exploration ($\beta = -.163$, $p = .014$) were significant single predictors of an increase in differentiation over one year. The negative influence of environmental exploration could, however, also be explained by its significant overlap in shared variance with self-exploration. To test this assumption self- and environmental exploration were added in separate steps in a post-hoc analysis. The results showed that self-exploration alone explained a significant amount of variance above the personality traits, $\beta = .141$, $\Delta F(1, 243) = 6.47$ $p = .012$, $\Delta R^2 = .017$, while environmental exploration did not, $\beta = -.025$, $\Delta F(1, 243) = 0.2$, $p = .648$, $\Delta R^2 = .001$. The results should thus be interpreted that self-exploration was positively related and environmental exploration was not related to development of differentiation.

Development of elevation. To evaluate the influence of personality traits and exploration behavior on interest elevation development the same procedure as explained above for differentiation was undertaken, with elevation at T2 as the dependent variable and controlling for elevation at T1 in a first step of the regression analysis. The results showed that gender and nationality explained a significant amount of change, $\Delta F(2, 249) = 3.2$, $p = .044$, $R^2 = .235$, $\Delta R^2 = .019$. Personality traits explained a significant additional amount, $\Delta F(5, 244) = 3.4$, $p = .005$, $\Delta R^2 = .050$, and exploration behavior explained additional variance in elevation development above personality traits, $\Delta F(2, 242) = 6.1$, $p = .003$, $\Delta R^2 = .034$. Male gender ($\beta = .140$, $p = .013$), more openness

(β = .186, p = .001) and more environmental exploration (β = .231, p = .001) were single significant predictors of an increase in interest elevation.

Criterion validity of differentiation. The next analyses were directed at testing the hypotheses that an increase in differentiation predicted an increase in career decidedness. Decidedness at T2 was the dependent variable. In a first step, decidedness at T1 was entered into the equation which means that all subsequent variables are evaluated whether they can predict change in decidedness over time above the stability of the construct itself. Gender and nationality were controlled for in the second step. Personality traits were entered in a third step. To establish whether change in differentiation predicts change in decidedness over basic personality traits the change in differentiation and elevation were added in a fourth step. Change in these two variables was calculated by subtracting the standardized score at T1 from the respective score at T2. Higher values thus indicated an increase in the variable over time. To account for any interaction effects of differentiation and elevation change their product term was entered in a fifth step. The results showed that gender and nationality explained a significant amount of change in decidedness over one year, $\Delta F(2, 249) = 5.0$, p = .007, R^2 = .227, ΔR^2 = .031. Personality traits explained an additional amount, $\Delta F(5, 244) = 2.8$, p = .016, ΔR^2 = .042. Change in differentiation and elevation missed the p = .05 significance level of explained variance above personality traits for this sample size, $\Delta F(2, 242) = 2.9$, p = .056, ΔR^2 = .017, and the interaction of the two was not significant above the already assessed variables, $\Delta F(1, 241) = 0.7$, p = .415, ΔR^2 = .002. Swiss nationality (β = .168, p = .003), more conscientiousness, (β = .141, p = .017) and development of more differentiated interests (β = .136, p = .016) significantly predicted an increase in decidedness.

Criterion validity of elevation. To test whether more elevated interests would subsequently predict more career exploration a multiple regression analysis with career exploration at T2 as the dependent variable was conducted. The sum-score of the standardized values for self- and environmental exploration was taken as the outcome measure. Again, the value for exploration at T1 (Step 1), gender and nationality (Step 2) and personality traits (Step 3) were added first into the equation. Elevation and differentiation at T1 were then added in Step 3 and their interaction term in Step 4. All variables except the interaction term were standardized. Gender and nationality could not predict an increase in exploration behavior, $\Delta F(2, 246) = 1.1$, $p = .320$, $R^2 = .113$, $\Delta R^2 = .008$. However, personality traits explained a significant amount of additional variance, $\Delta F(5, 246) = 2.8$, $p = .017$ $\Delta R^2 = .049$. Contrary to the expectation elevation and differentiation could not explain an additional amount of variance above personality traits, $\Delta F(2, 239) = 0.9$, $p = .4.16$, $\Delta R^2 = .006$. The interaction of elevation and differentiation explained a small but nonsignificant additional amount of variance in increase of exploration behavior, $\Delta F(1, 238) = 3.8$, $p = .063$, $\Delta R^2 = .012$. More neuroticism ($\beta = .166$, $p = .024$) and conscientiousness ($\beta = .177$, $p = .006$) were significant predictors of more career exploration.

Tables containing the complete regression models for all analyses are available from the author upon request.

Discussion

Vocational interests are a cornerstone to understand career choice, career development, and work satisfaction (Holland, 1997; Lent, Brown, & Hackett, 1994). Most frequently, interests are assessed to understand *what* a person is interested in.

However, interest assessment can also provide information of *how* vocational interests are developed which can have important implications to understand career behavior. Two core components of interest development in this sense are the differentiation (distinctness) and elevation (general interest level) of a person's interests. Previous research showed that both constructs show relations to personality characteristics and various aspects of vocational behavior. However, there is still debate over to what degree these variables are useful to predict other career development variables. Also, literality nothing is known about their development over time and potential predictors of their change or stability. The present study provides new empirical evidence of their construct and criterion validity and presents a first investigation on their development in adolescence. One study addressed these issues with a cross-sectional design among Swiss high school students in eleventh grade. The other study used a one-year longitudinal approach from Swiss students in seventh to eighth grade to address the same questions. Since both studies share the same theoretical and basic methodological approach, their results will be discussed together.

Influence of Gender and Nationality

The present studies show that gender is an important factor to understand differences in interest differentiation and elevation. In both groups of students girls showed more differentiation than boys which is in accordance with previous research (Fouad & Mohler, 2004; Miner, Osborne, & Jaeger, 1997). However, boys showed a stronger increase in differentiation over the course of the eighth grade compared to girls but the differences still remained significant until late adolescence. Among the younger group of students girls also had more elevated interest at the end of seventh grade.

However, boys subsequently showed a stronger increase in development of elevation compared to girls which led this difference to disappear until the end of eighth grade. Also, no gender difference in elevation was found among the group in eleventh grade. These results imply that gender differences in differentiation remain consistent during adolescence while differences in elevation tend to disappear relatively early. Also supporting previous findings (Fouad & Mohler, 2004; Hirschi & Läge, 2007) minority status did not show a significant influence on differentiation or elevation development.

Interest Differentiation Development and Criterion Validity

The study shows that interest differentiation is not related to personality traits in seventh grade and eleventh grade. However, at the end of eighth grade it is significantly associated with favorable personality dispositions such as emotional stability, extraversion, agreeableness, and conscientiousness. The longitudinal analysis also shows that traits, particularly more extraversion and agreeableness, are significantly related to the development of more differentiation in early adolescence. This implies that having positive personality dispositions favors the development of more differentiated interest in early adolescence and that having differentiated interests at the end of an environmentally imposed career decision-making process is associated with positive traits. This relation seems to weaken, however, until middle to late adolescence where only extraversion was still significantly related to more differentiation.

As was expected, career exploration behavior was also significantly related to the development of differentiation. Particularly self-exploration (i.e., reflecting about personal interests, values, and abilities) is a significant predictor of developing more differentiated interests in early adolescence. The link between exploration behavior and

differentiation was, however, not found among students at the end of eleventh grade. This could imply that it plays an important part in the early development but is less important in later adolescence.

The examination of the criterion-related validity of differentiation did not show the expected positive relations to vocational identity in the cross-sectional Study 1. However, the present longitudinal analysis provides some strong new evidence that an increase in differentiation is indeed positively related to becoming more decided in career decision-making in early adolescence above the significant effect of personality traits.

Interest Elevation Development and Criterion Validity

Elevation showed a consistent positive relation to more openness among both groups of adolescents at all measurement points. Being more open was already positively related to having more elevated interests at the end of seventh grade and it acted as a significant predictor of even more elevation development during the next year. The positive relation was also found for the group at the end of eleventh grade. However, no relations were observed to generally positive personality traits and neither neuroticism nor conscientiousness was strongly related to development of elevation. These results do not support a notion that higher elevated interests are a sign of a more adapted personality but supports the notion that is related to and predicted by more intellectual curiosity and openness.

As expected, career exploration behavior was also positively related to elevation development. Specifically, more environmental exploration (e.g., visiting work places or obtaining occupational information) predicted the development of more interest elevation in early adolescence and was also significantly related to it among the students at the end

of eleventh grade. As implied by social-cognitive theories of career development (Lent, Brown, & Hackett, 1994; Mitchell & Krumboltz, 1996) the learning experiences made in such exploration activities could develop more positive self-efficacy and outcome expectations towards different activities which then results in an increase in interests in different fields.

The criterion-related validity of interest elevation has been questioned in the literature (Gottfredson & Jones, 1993). The present study could not present support for the assumption that more elevated interests would predict more active career exploration. On a cross-sectional basis, more elevation predicted more career exploration activities in eleventh grade. However, the longitudinal study in seventh to eighth grade could not support the notion of a significant influence of elevation on exploration above the influence of personality traits. In eleventh grade, the combined examination of elevation with differentiation explained a significant amount of variance in exploration behavior. This trend was also found in the longitudinal analysis of seventh through eighth grade although it was not statistically significant. These results indicate that there is a slight negative influence of the combination of low differentiated and low elevated interests on subsequent career exploration behavior which underlines the previously made point that this combination is associated with less favorable outcomes (Swanson & Hansen, 1986). Overall, the results imply that elevation is meaningfully related to personality dispositions and could be regarded as an indicator of vocational flexibility and openness (Darcy & Tracey, 2003). However, the study cannot support a claim that elevation indicates a clients' energy level (Bullock & Reardon, 2005) and implies caution in overestimating the potential influence of interest elevation on subsequent career behavior.

Limitations

One limitation of the present study is that it applied a convenience sample which limits its generalizability. It can be further assumed that the specific demands of the Swiss educational system promoted a somewhat different development of differentiation and elevation in eighth grade than what could be expected in more college-oriented educational systems like the U.S. While this can also be seen as a strength of the study to enrich our understanding of interest development in different contexts, it calls for replication in other educational systems.

Another limitation is that two different measures for career exploration were applied at the two measurement points in Study 2. This makes it impossible to directly compare the change of this construct of time. However, this should not be interpreted as a potential reason for the non-significant results for elevation to predict subsequent career exploration since the measure at the first measurement point acted only as a control variable in the regression analysis.

Finally, the study relied exclusively on self-reported measures which limits the validity of the results due to shared methodological measurement error of the applied scales.

Implications for Counseling and Assessment Practice

The study implies that counselors should treat interest differentiation and elevation as two important aspects of a client's vocational interest development. Supporting adolescents in developing more differentiated interests could help them to reach a decision about their educational/vocational future. This could be achieved by promoting more self-exploration. Interest elevation can be regarded as a sign of more

openness and vocational flexibility. However, counselor should not assume that an adolescent with more elevated interests will automatically be more active in his or her career decision-making process. Promoting the development of more elevated interests could be a fruitful goal in counseling in order to increase vocational flexibility and presumably subsequent educational and job satisfaction (Darcy & Tracey, 2003). The present study suggests that counselors promote more environmental exploration for students with low elevated profiles in order to reach this goal.

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Table 1. Correlations of the Applied Measures in Study 1 (N = 210)

	1	2	3	4	5	6	7	8	9	10	11	12
1 Gender	-											
2 Nationality	.044	-										
3 Differentiation	-.294***	-.086	-									
4 Elevation	.098	-.017	-.089	-								
5 Identity	.006	.041	.067	-.062	-							
6 Neuroticism	-.188**	-.032	.001	-.084	-.275***	-						
7 Extraversion	-.076	.030	.152*	.088	.211**	-.337***	-					
8 Openness	.049	-.026	.102	.236***	.083	.077	-.042	-				
9 Agreeableness	-.195**	.038	.118	-.100	.103	-.102	.230***	.140*	-			
10 Conscientiousness	-.033	.040	.023	-.083	.269***	-.094	-.010	-.073	.153*	-		
11 Self-Expl	.004	-.069	.014	.341***	.046	.019	-.066	.192**	.022	.098	-	
12 Environment-Expl	.142*	-.114	-.078	.347***	.152*	-.107	.002	.082	-.096	.135	.521***	-

Note . Correlations for gender and nationality are Spearman all other Pearson

Coding: Gender 0 = female; 1 = male; Nationality 0 = Swiss; 1 = other

$^{*}p \leq .05$; $^{**}p \leq .01$; $^{***}p \leq .001$

Table 2. Bivariate Correlations among the Assessed Measures for Study 2 ($N = 289$)

	1	2	3	4	5	6	7	8	9	10
1 Gender	-									
2 Nationality	-.059	-								
3 Differentiation T1	-.166**	-.082	-							
4 Elevation T1	-.148*	.064	.005	-						
5 Differentiation T2	-.215***	-.077	.496***	-.038	-					
6 Elevation T2	.056	.017	-.090	.462**	-.125*	-				
7 Decidedness T1	.112	-.076	.022	-.047	-.079	.004	-			
8 Decidedness T2	.090	-.182**	-.045	.048	.096	.046	-.442***	-		
9 Neuroticism	-.102	.017	-.025	.048	-.137*	.036	-.159**	-.158*	-	
10 Extraversion	-.211**	-.001	.110	.060	.260***	.063	.056	.125*	-.462***	-
11 Openness	-.060	-.005	.096	.249***	.065	.293***	.044	-.005	.023	.044
12 Agreeableness	-.263**	-.016	-.017	-.002	.208***	-.034	.099	.167**	-.373***	.437***
13 Conscientiousness	-.104	-.020	.055	.015	.165**	.091	.109	.213**	-.252***	.189**

14 Exploration T1	.071	.110	-.030	.161**	-.089	.121	.191***	.216***	.011	-.004
15 Self-Expl. T2	-.131*	-.015	.028	.055	.201***	.068	.179**	.292***	.099	.143*
16 Environment-Expl. T2	.029	-.050	-.103	.068	-.062	.212***	.224***	.432***	.069	-.001

Table 2 (continued)

	11	12	13	14	15	16
1 Gender						
2 Nationality						
3 Differentiation T1						
4 Elevation T1						
5 Differentiation T2						
6 Elevation T2						
7 Decidedness T1						
8 Decidedness T2						
9 Neuroticism						
10 Extraversion						
11 Openness	-					
12 Agreeableness	-.003	-				
13 Conscientiousness	.119	.304***	-			
14 Exploration T1	-.082	-.018	.002	-		
15 Self-Expl. T2	.037	.214***	.160**	.193**	-	
16 Environment-Expl. T2	-.040	.026	.168**	.263***	.582***	-

Note. $N = 289$ for measures at T1; $n = 255$ for measures at T2 (including measures 9 to 13)

Correlations for Variables 1 and 2 are Spearman all others Pearson

Coding: Gender 0 = female; 1 = male; Nationality 0 = Swiss; 1 = other

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$